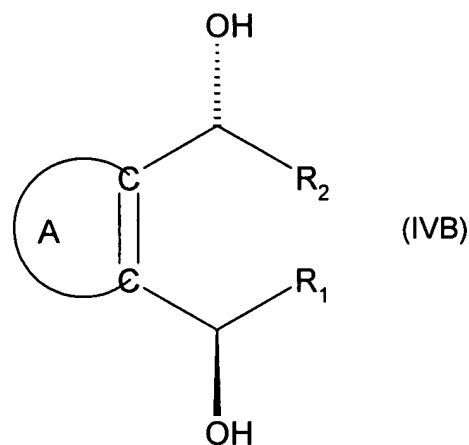
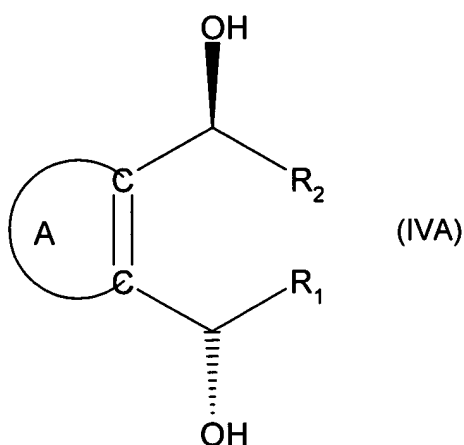


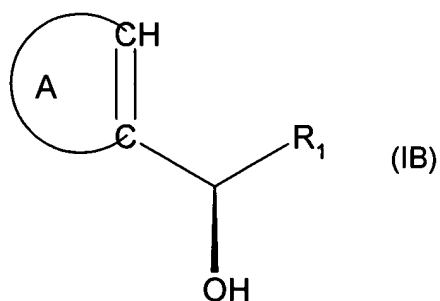
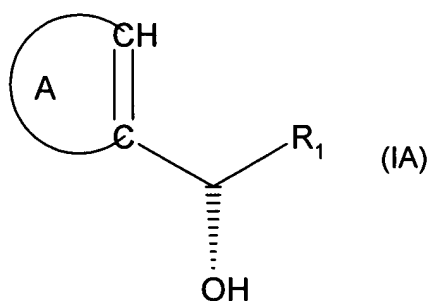
## IN THE CLAIMS

1. (currently amended): A process for the preparation of  $C_2$ -symmetric 1,4-diols of the formula IVA or IVB having a high enantiomeric purity

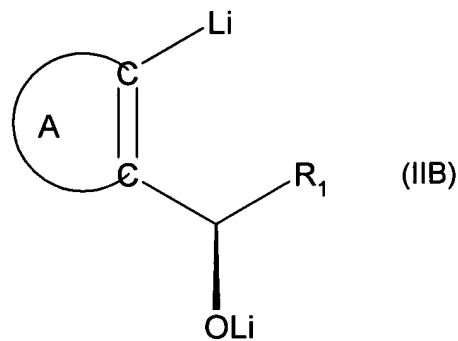
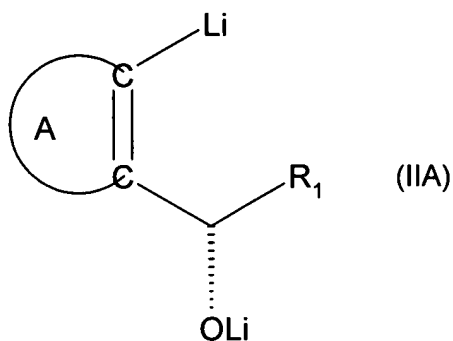


wherein ring A which includes the shown double bond forms a mono-, di- or polycyclic aromatic or heteroaromatic ring and  $R_1$  and  $R_2$  are, independently of each other, an organic moiety,

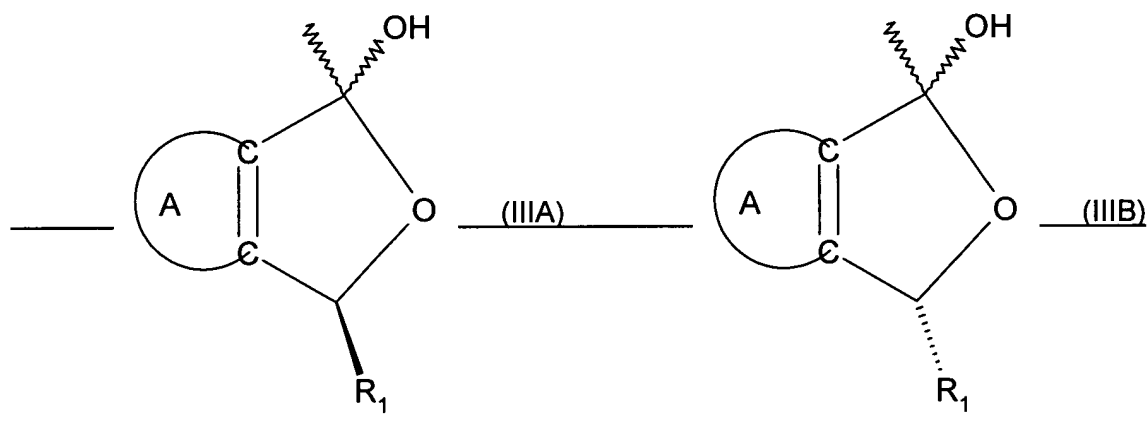
the process comprising reacting an  $\alpha$ -(aryl or heteroaryl)- $\alpha$ -substituted alkanol compound of the formula IA (for the synthesis of a compound of the formula IVA) or IB (for the synthesis of a compound of the formula IVB)



wherein ring A and  $R_1$  are as defined under formula IVA and IVB, with a lithiating reagent, obtaining an intermediate of the formula IIA (from IA) or IIB (from IB),



wherein ring A and R<sub>1</sub> have the meanings given under compounds of the formulae IVA and IVB, said process further comprising reacting the lithiated product of the formula IIA or IIB, respectively, with an N,N-di-alkyl-formamide to form a hemiacetal compound of the formula IIIA (from IIA) or IIIB (from IIB).



wherein ring A, R<sub>1</sub> and R<sub>2</sub> have the meanings indicated for compounds of the formula IVA and IVB, and subsequently with a Grignard reagent of the formula R<sub>2</sub>MgX wherein R<sub>2</sub> is an organic moiety and X is halogen or, alternatively, using corresponding lithium, zinc or other metal comprising compounds that allow for introduction of R<sub>2</sub>; to yield the corresponding compounds of formula IVA (from IIIA) and IVB (from IIIB).

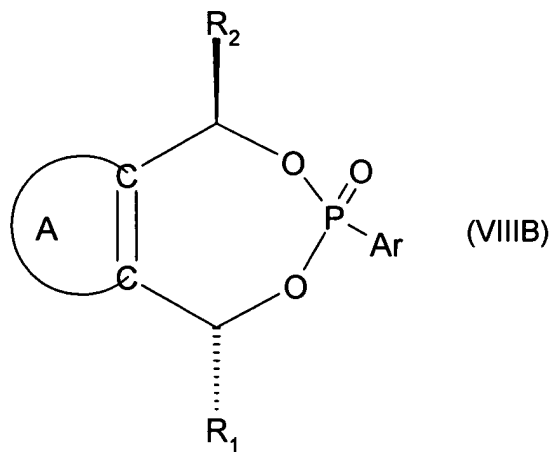
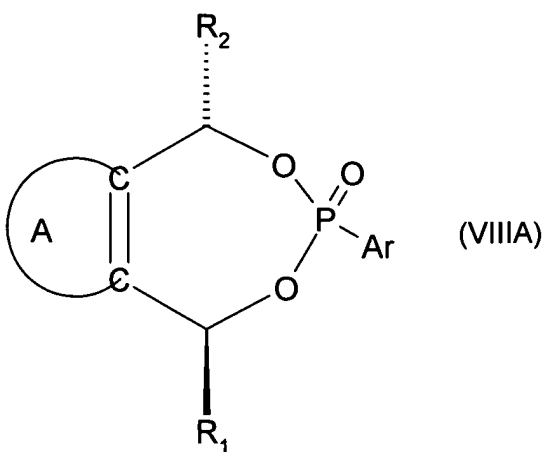
2-4. (cancelled).

5. (previously presented): A process for the preparation of a ligand of the formula XA, XA\*, XB or XB\* given below,

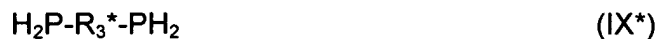
said process comprising reacting a compound of the formula IVA (for the synthesis of a compound of the formula XA) or IVB (for the synthesis of a compound of the formula XB) obtained according to claim 1 with an aryl phosphinic acid halogenide of the formula VII;



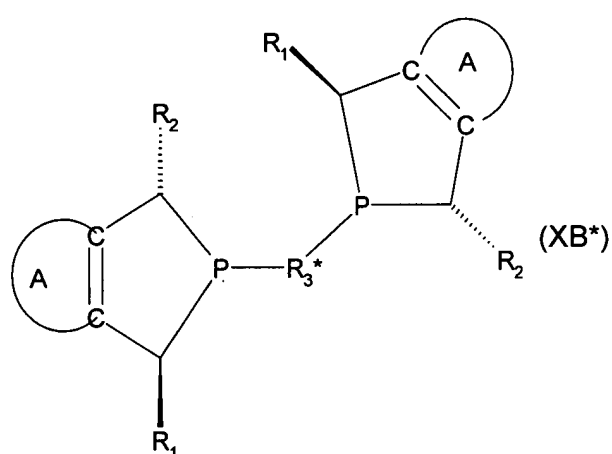
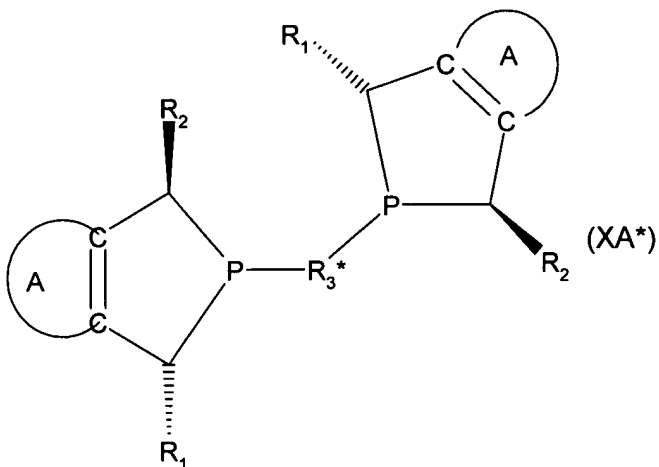
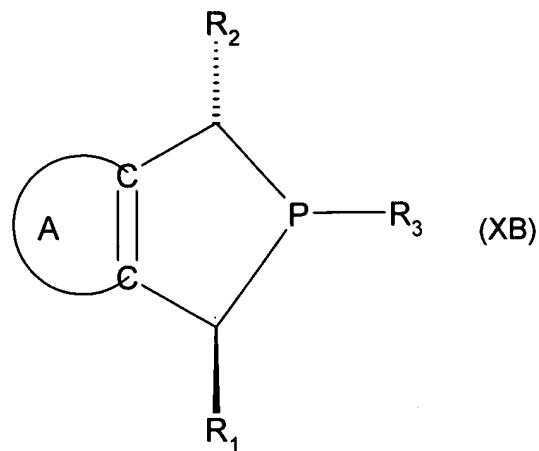
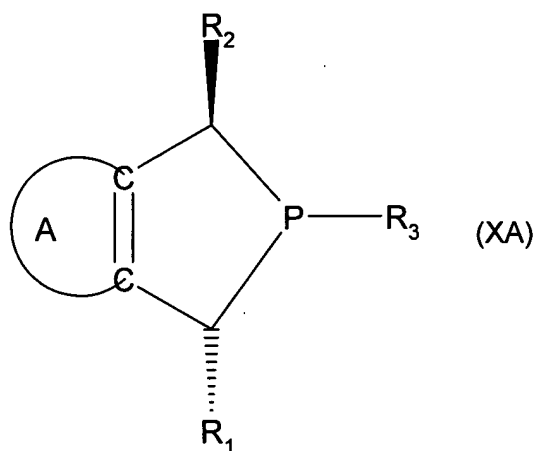
wherein Ar is aryl and Hal is halogen, in the presence of a base resulting in the formation of a phosphonate ester compound of the formula VIIIA (from IVA) or VIIIB (from IVB), respectively,



wherein ring A,  $R_1$  and  $R_2$  have the meanings indicated for compounds of the formula IVA and IVB and Ar is aryl, and then reacting a compound of the formula VIIIA or VIIIB with a phosphine of the formula IX or IX\*,



(or the corresponding borane adduct thereof) wherein  $R_3$  is a monovalent and  $R_3^*$  is a bivalent organic moiety that can be bound to phosphorus, resulting in a phospholane compound of the formula XA or XA\* (from VIIIA); or XB or XB\* (from VIIIB), respectively,



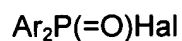
wherein ring A,  $R_1$  and  $R_2$  have the meanings indicated for compounds of the formula IVA or IVB and  $R_3$  or  $R_3^*$  is as defined under formulae IX and IX\*, respectively.

6. (original): A ligand of the formula XA, XA\*, XB or XB\*, as shown and defined in claim 5.

7. (original): A transition metal complex comprising a ligand of the formula XA, XA\*, XB or XB\*, as shown and defined in claim 5.

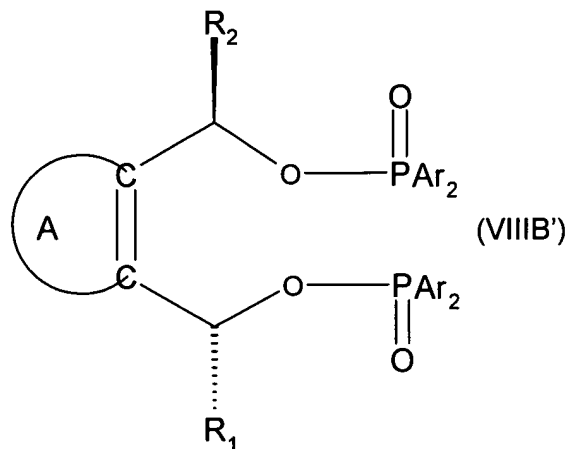
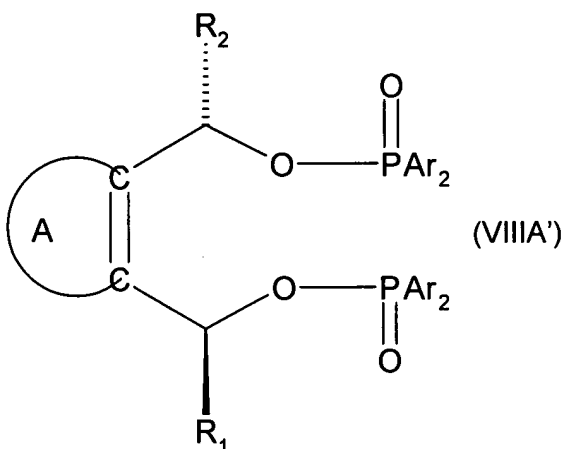
8. (previously presented): A process for the preparation of a ligand of the formula XA, XA\*, XB or XB\* given below,

said process comprising reacting a compound of the formula IVA (for the synthesis of a compound of the formula XA) or IVB (for the synthesis of a compound of the formula XB) obtained according to claim 1 with an aryl phosphinic acid halogenide of the formula VII';



(VII')

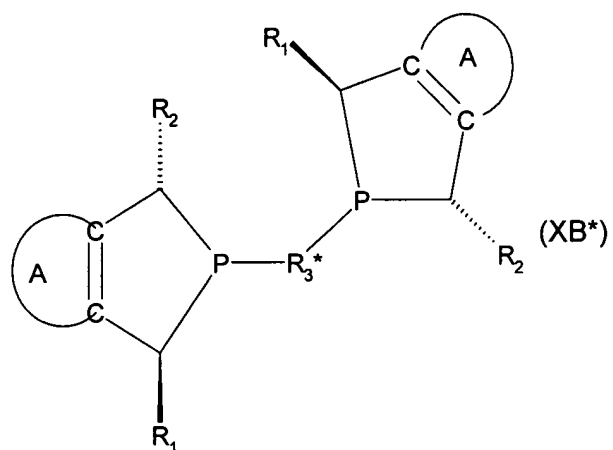
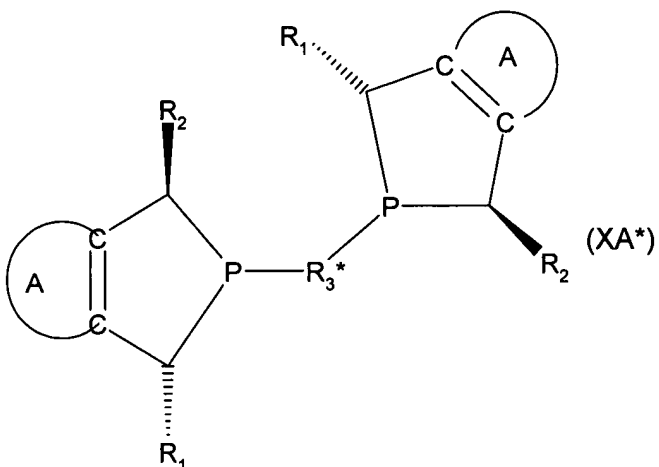
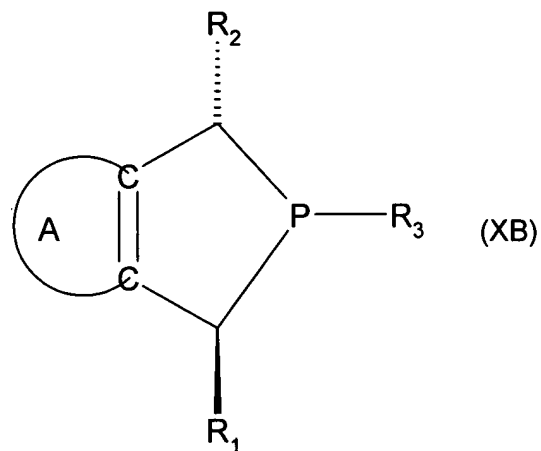
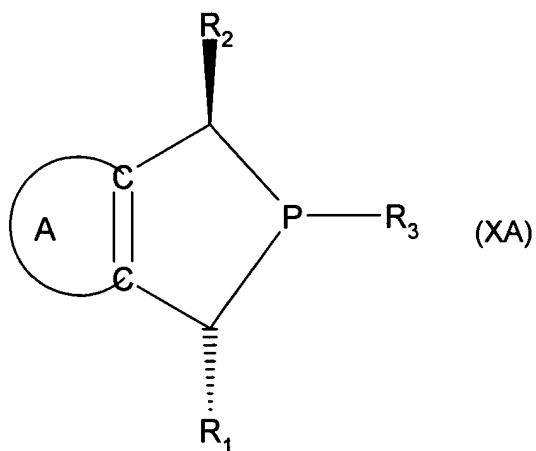
wherein Ar is aryl and Hal is halogen, in the presence of a base resulting in the formation of a compound of the formula VIIIA' (from IVA) or VIIB' (from IVB), respectively,



wherein ring A, R<sub>1</sub> and R<sub>2</sub> have the meanings indicated for compounds of the formula IVA and IVB in claim 1 and Ar is aryl, and then reacting a compound of the formula VIIIA' or VIIB' with a phosphine of the formula IX or IX\*,

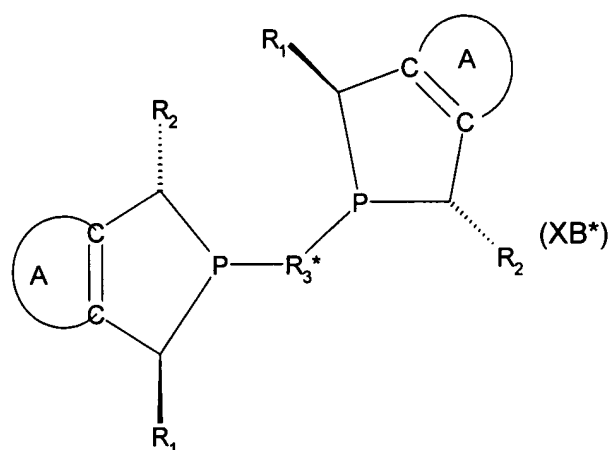
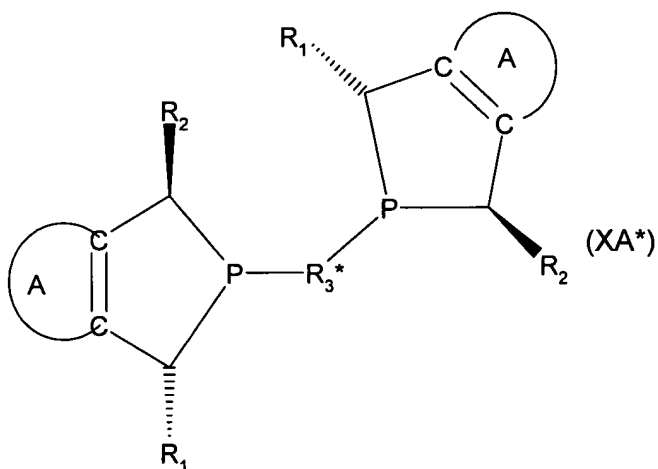
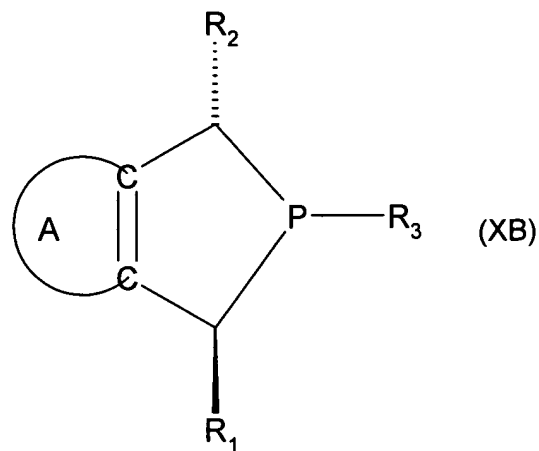
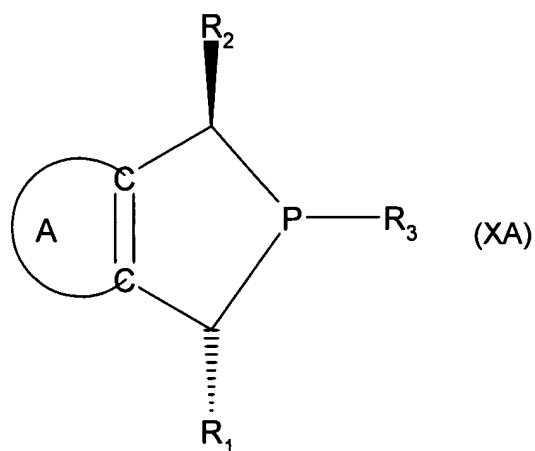


(or the corresponding borane adduct thereof) wherein R<sub>3</sub> is a monovalent and R<sub>3</sub>\* is a bivalent organic moiety that can be bound to phosphorus, resulting in a phospholane compound of the formula XA or XA\* (from VIIIA); or XB or XB\* (from VIIB), respectively,



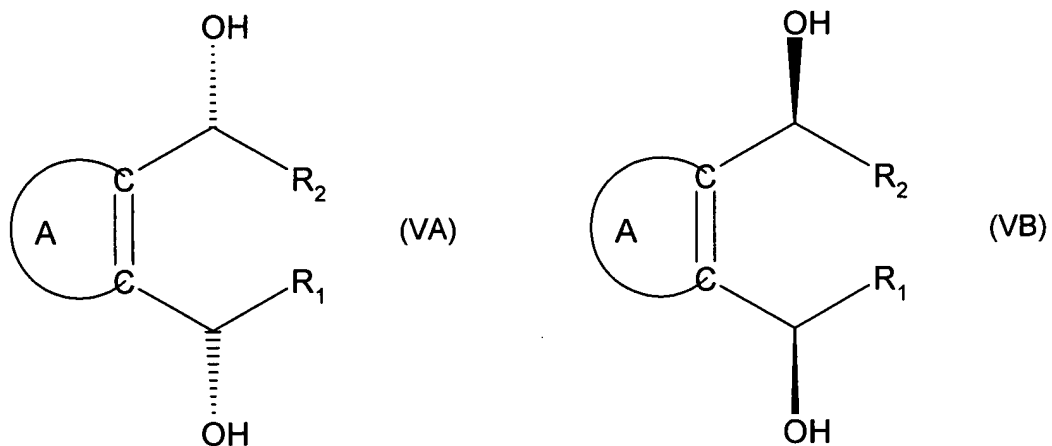
wherein ring A, R<sub>1</sub> and R<sub>2</sub> have the meanings indicated for compounds of the formula IVA or IVB in claim 1 and R<sub>3</sub> or R<sub>3</sub><sup>\*</sup> is as defined under formulae IX and IX<sup>\*</sup>, respectively.

9. (previously presented): A process for the preparation of a compound of the formula XA, XA<sup>\*</sup>, XB or XB<sup>\*</sup>,

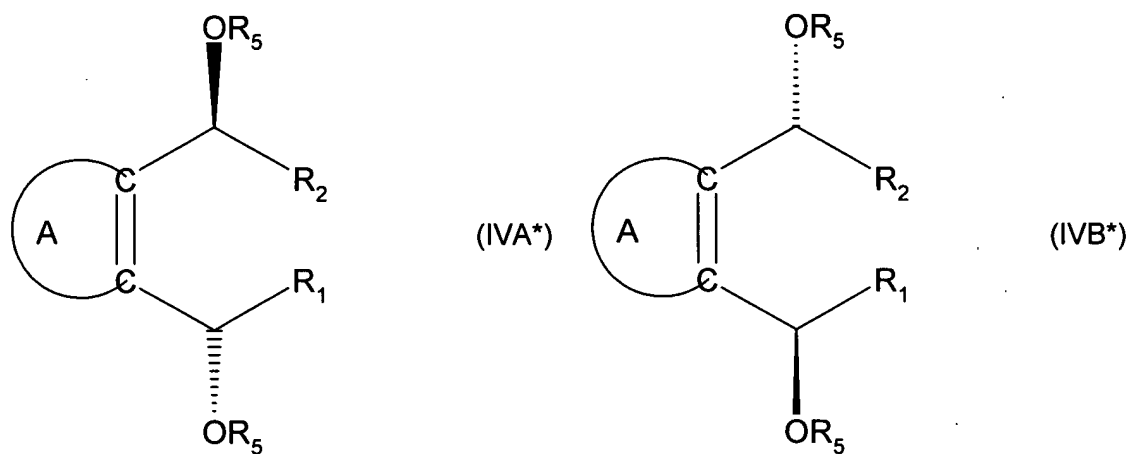


wherein ring A, R<sub>1</sub> and R<sub>2</sub> have the meanings indicated for compounds of the formula IVA or IVB in claim 1 and R<sub>3</sub> or R<sub>3</sub><sup>\*</sup> is as defined under formulae IX and IX<sup>\*</sup>, respectively

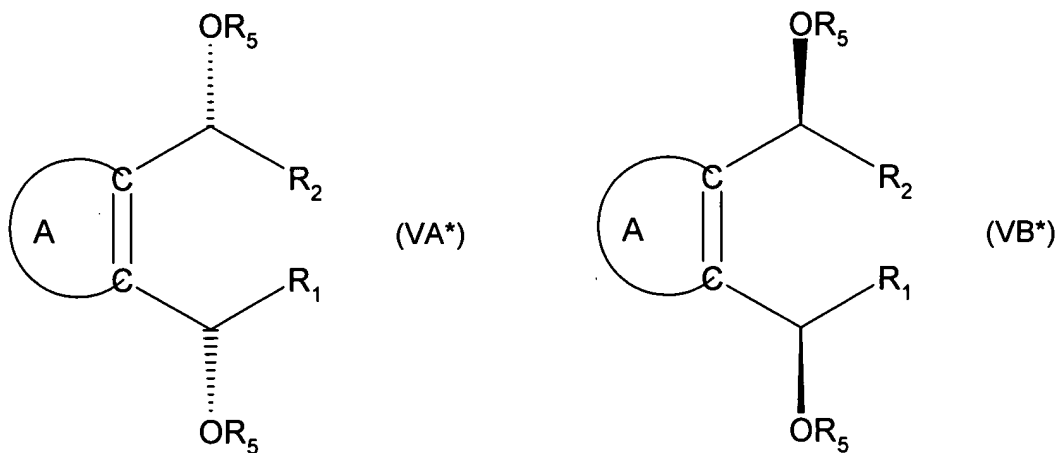
said process comprising reacting a compound of the formula IVA or IVB given in claim 1, or a mixture of a compound of the formula IVA and VA, or of a compound of the formula IVB and VB,



wherein ring A, R<sub>1</sub> and R<sub>2</sub> have the meanings indicated for compounds of the formula IVA and IVB, with an agent introducing an acyl protecting group, obtaining the corresponding bis-hydroxy-protected compounds of the formula IVA\* (from IVA), IVB\* (from IVB), or mixtures of a compound of the formula IVA\* and VA\* (from a mixture of a compound of the formula IVA and VA) or of a compound of the formula IVB\* and VB\* (from a mixture of a compound of the formula IVB and VB),







wherein ring A,  $R_1$  and  $R_2$  have the meanings indicated for compounds of the formula IVA and IVB and  $R_5$  is acyl, and then reacting the compound or compounds to the corresponding compounds of the formulae XA shown above with a compound of the formula IX,



or a borane adduct thereof, wherein  $R_3$  is a monovalent organic moiety that can be bound to phosphorus,

or for a compound of the formula  $XA^*$  shown above with a compound of the formula  $IX^*$ ,

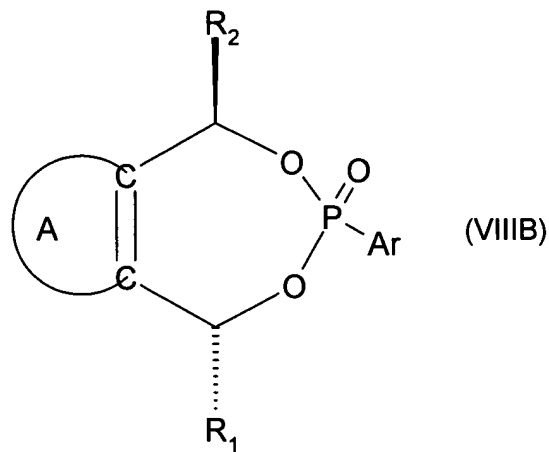
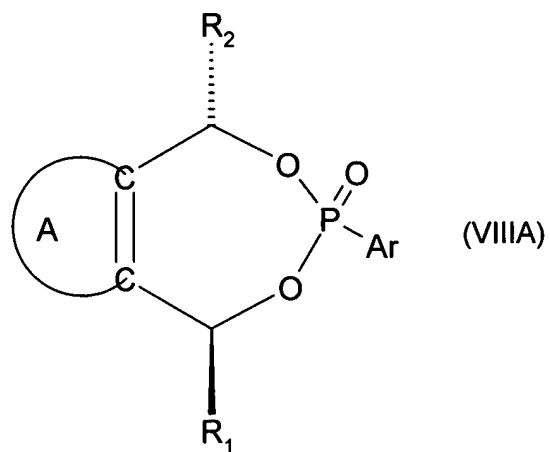


or a borane adduct thereof, wherein  $R_3^*$  is a bivalent organic moiety that can be bound to phosphorus, in both cases starting from a compound of the formula IVA\* (alone or optionally in mixture with a compound of the formula VA\*);

or of the formula XB shown above with a compound of the formula IX shown above or a borane adduct thereof, or to a compound of the formula  $XB^*$  shown above with a compound of the formula  $IX^*$  shown above or a borane adduct thereof, in both cases starting from a compound of the formula from IVB\* (alone or optionally in mixture with a compound of the formula VB\*),

in the case of mixtures of compounds of the formula IVA\* and VA\* or IVB\* and VB\* optionally after isolating the compounds of the formula IVA\* or IVB\*, respectively, from the undesired enantiomer of the formula VA\* or VB\*.

10. (previously presented): The process according to claim 9, further comprising reacting the compound of the formula



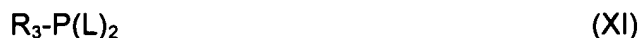
wherein ring A, R<sub>1</sub> and R<sub>2</sub> have the meanings indicated for compounds of the formula IVA and IVB in claim 9 and Ar is aryl, with a phosphine of the formula IX or IX\*,



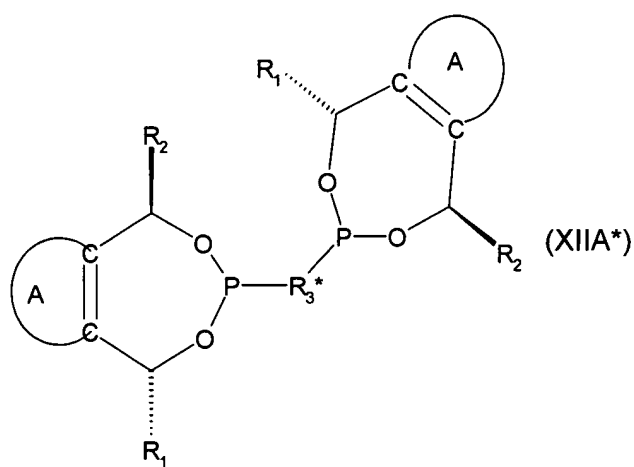
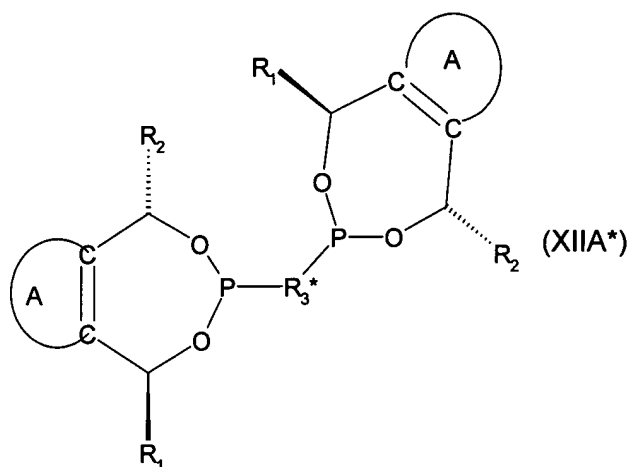
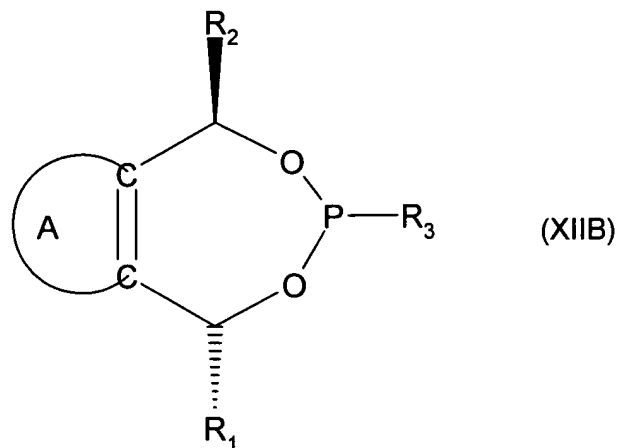
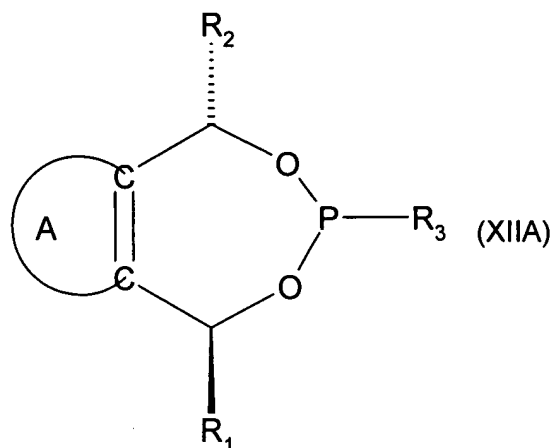
(or the corresponding borane adduct thereof) wherein R<sub>3</sub> is a monovalent and R<sub>3</sub>\* a bivalent organic moiety that can be bound to phosphorus, resulting in a phospholane compound of the formula XA or XA\* (from VIII A); or XB or XB\* (from VIII B) shown in claim 9, respectively.

11. (previously presented): A process for the preparation of a ligand of the formula XIIA or XIIA\* shown below from a compound of the formula IVA as defined in claim 1 or of the formula XIIB or XIIB\* shown below from a compound of the formula IVB as defined in claim 1, comprising

a) reacting a compound of the formula IVA or IVB with a compound of the formula XI or XI\*,

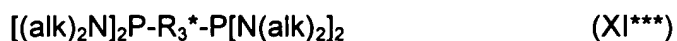


wherein  $R_3$  is a monovalent and  $R_3^*$  a bivalent organic moiety that can be bound to phosphorus and L is a leaving group, leading to ligands of the formula XIIA or XIIA\* (from IVA) and/or XIIB or XIIB\* (from IVB),



wherein ring A,  $R_1$  and  $R_2$  have the meanings indicated for compounds of the formula IVA and IVB in claim 1 and  $R_3$  is a monovalent and  $R_3^*$  a bivalent organic moiety that can be bound to phosphorus; or

b) reacting a compound of the formula IVA or IVB with a compound of the formula XI\*\* or XI\*\*\*,



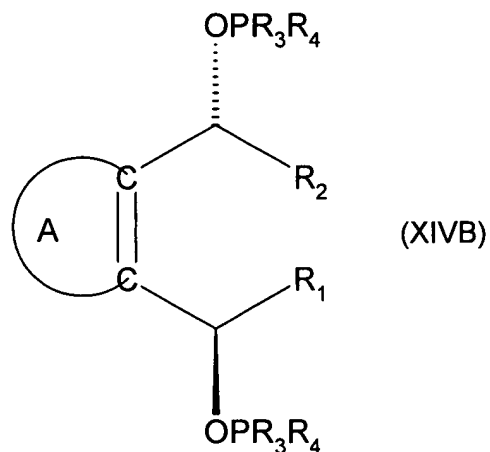
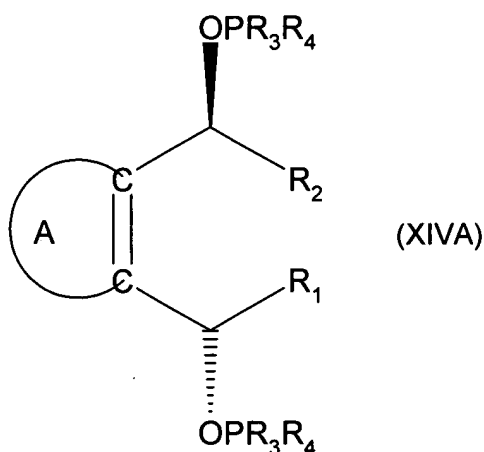
wherein  $R_3$  is a monovalent and  $R_3^*$  a bivalent organic moiety and

alk is alkyl which can be linear or cyclic, or is a heterocyclic radical, with removal of the secondary amine  $\text{HN}(\text{alk}_2)_2$ , yielding the compound of formula XIIA or XIIA\* (from IVA); or XIIB or XIIB\* (from IVB) described above, respectively.

12. (original): A ligand of the formula XIIA, XIIA\*, XIIB or XIIB\*, as shown in claim 11.

13. (original): A transition metal complex comprising a ligand of the formula XIIA, XIIA\*, XIIB or XIIB\*, as shown in claim 11.

14. (previously presented): A process for the preparation of a ligand of the formula XIVA from a compound of the formula IVA or of the formula XIVB from a compound of the formula IVB,



wherein ring A,  $R_1$  and  $R_2$  are as defined for compounds of the formula IVA or IVB in claim 1 and  $R_3$  and  $R_4$  each are, independently of the other, an organic moiety that can be bound to phosphorus,

said process comprising reacting a compound of the formula IVA or VIB given in claim 1, respectively, with

a) a compound of the formula XIII,



wherein  $R_3$  and  $R_4$  are organic moieties that can be bound to phosphorus and L is a leaving group, resulting in a compound of the formula XIVA (from IVA) or XIVB (from IVB), respectively; or

b) with a compound of the formula XIII\*,



wherein  $\text{R}_3$  and  $\text{R}_4$  are, independently from each other, an organic moiety and alk is alkyl which can be linear or cyclic, or is a heterocyclic radical, with removal of the amine  $\text{H}_2\text{N}(\text{alk})_2$ .

15. (original): A ligand of the formula XIVA or XIVB, as shown in claim 14.

16. (original): A transition metal complex comprising a ligand of the formula XIVA or XIVB, as shown in claim 14.

17. (cancelled).